

Subject 650 North Central Ave.

Date 4/4/02

To Brian McCarthy

From Joy Mitchell

Copy Wayne Gratz
To Fred Ulanday
Joe Corso
Kevin Kearns

As requested, testing was performed on a series of various scenarios for 650 North Central Ave. The test set-up was performed at TTS using the following materials.

1. (3) Kuhlman Gauges
2. (1) Manometer
3. (1) Stopwatch
4. (2) D2 Meters (360chf)
5. (1) 1" Load Manifold
6. 1 1/4" x 12 1/2' Long Pipe

All Kuhlman gauges and Manometers were checked for accuracy prior to testing, compressed air was used at room temperature utilizing a "BTU input rate calculator" for determining BTU per hour usage.

Test Procedures: Compressed air was introduced into the system while 6" w.c. pressure was maintained at the outlet of meter #1. Pressure of compressed air entering the "house" meter and by pass was adjusted as needed. All Btu/Hr readings were performed 3 times to assure accuracy and documented.

The "BTU input rate calculator" was used for all reporting of figures. A 15-minute test was also performed to verify accuracy of "BTU input rate calculator"

(See attached data sheet and pictures)

Test Set-up performed by: Mary Gergits, Vic Perales

Testing performed by: Mary Gergits, Vic Perales

Test Observers: Joy Mitchell

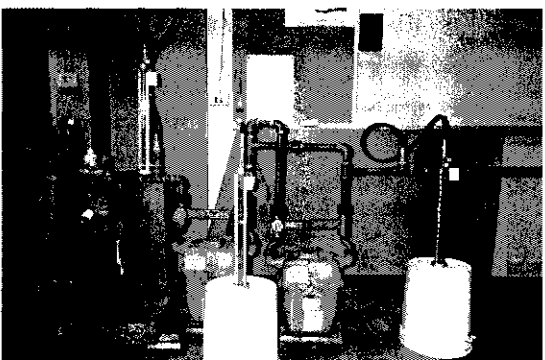
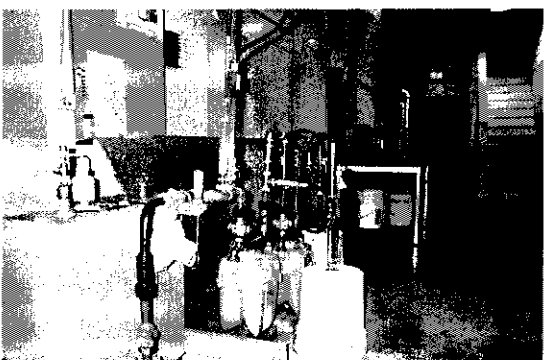
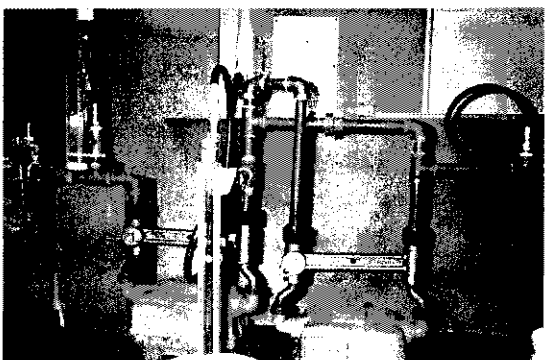
Reported By: Joy Mitchell

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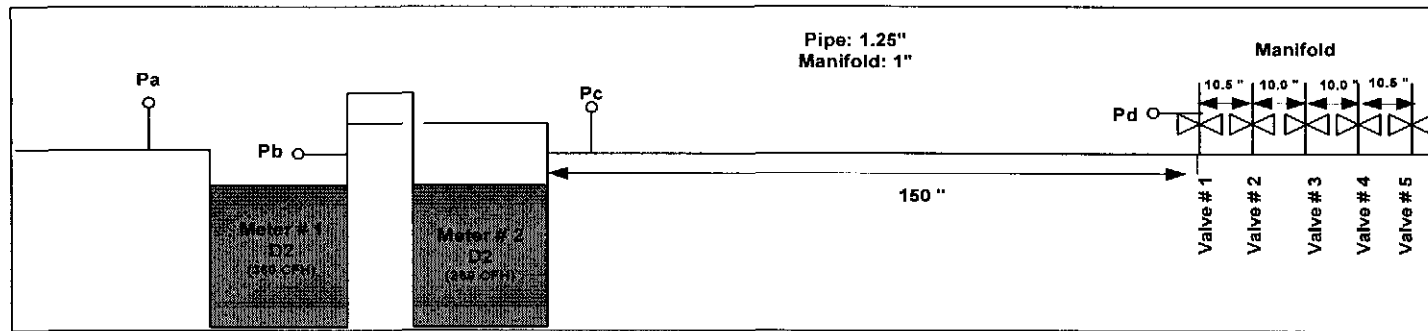
Witness _____
Date 5/6/02 Reporter GC

Test set up





By- Pass Experiment Results



Theoretical Use							Actual Use							Pressure			
Open Valves					Load		Meter #1		Meter #2		By-Pass		%	Inches / Water			
1	2	3	4	5	Btu/Hr	Btu/Qtr Hr	Btu/Hr	Btu/Qtr Hr	Btu/Hr	Btu/Qtr Hr	Btu/Hr	Btu/Qtr Hr	Through By-Pass	Pa	Pb	Pc	Pd
X					26,140.00	6,535.00	26,140.00	6,535.00	0.00	0.00	26,140.00	6,535.00	100.00	6.4	6.0	6.0	6.0
			X		78,415.00	19,603.75	79,950.00	19,987.50	0.00	0.00	79,950.00	19,987.50	100.00	6.4	6.0	6.0	6.0
	X	X	X	X	305,970.00	76,492.50	289,900.00	72,475.00	78,415.00	19,603.75	211,485.00	52,871.25	72.95	7.9	6.0	5.5	5.2
X	X	X	X	X	332,110.00	83,027.50	301,350.00	75,337.50	86,100.00	21,525.00	215,250.00	53,812.50	71.43	8.0	6.0	5.4	5.0

Valve #1 26,140 BTU/Hr Load (when open)

Valve #2 64,575 BTU/Hr Load (when open)

Valve #3 90,715 BTU/Hr Load (when open)

Valve #4 78,415 BTU/Hr Load (when open)

Valve #5 72,265 BTU/Hr Load (when open)

Meter #1 Registered total amount of compressed air that is entering the system

Meter #2 Registered amount of compressed air that was registered by the "house" meter

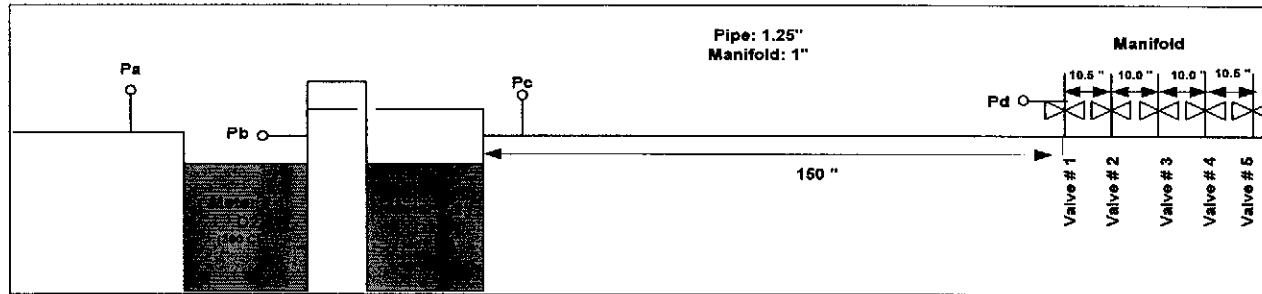
Pa Pressure of compressed air entering the system

Pb Pressure of compressed air entering the "house" meter and by-pass

Pc Pressure of compressed air downstream of the "house" meter and by-pass

Pd Pressure of compressed air at the load source

15 minute test to confirm Chart



Theoretical Usage						Actual Usage (1 minute test & use of Chart)								15 Minute Test				Pressure			
Open Valves					Load	Meter #1		Meter #2		By-Pass		%	Meter #1		Meter #2		Inches / Water				
1	2	3	4	5	Btu/Hr	Btu/Qtr	Btu/Hr	Btu/Qtr	Btu/Hr	Btu/Qtr	through By-Pass		Btu/Hr	Btu/Qtr	Btu/Hr	Btu/Qtr	Pa	Pb	Pc	Pd	
x	x	x	x	x	905,970.00	76,492.50	282,900.00	70,725.00	78,415.00	19,603.75	204,485.00	51,121.25	72.28	283,720.00	70,930.00	79,544.10	19,886.03	7.9	6.0	5.5	5.2

Equation Used: BTU/Hr = Revolution Per Minute * 60 * Size of Dial * 1025

Meter #1

Revolutions in 15 minutes:

$$346 \frac{\text{revolution}}{\text{quarter-hour}} * \frac{\text{quarter-hour}}{15 \text{ minutes}} = 2307 \text{ revolution per minute}$$

$$\frac{BTU}{Hr} = RPM * 60 * 2 * 1025$$

$$\frac{BTU}{Hr} = 2307 * 60 * 2 * 1025 = 283,720$$

Meter #2

Revolutions in 15 minutes:

$$9.7 \frac{\text{revolution}}{\text{quarter-hour}} * \frac{\text{quarter-hour}}{15 \text{ minutes}} = .6467 \text{ revolution per minute}$$

$$\frac{BTU}{Hr} = RPM * 60 * 2 * 1025$$

$$\frac{BTU}{Hr} = .6467 * 60 * 2 * 1025 = 79,544.1$$